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ABSTRACT

An activity was undertaken to develop written criterion-referenced tests for the forestry component of Applied Principles of Agribusiness and Natural Resources. Intended for tenth grade students who have completed Fundamentals of Agribusiness and Natural Resources Occupations, applied principles were designed to consist of three components, with each component comprising one-third of the school year. The forestry component was designed as a specialized component to be taught together with the common core and one other specialized component. A criterion-referenced test was developed for the forestry component from a list of competencies that was compiled. Project results were a list of specific competencies for the forestry component of Applied Principles of Agribusiness and Natural Resources Occupations and an item bank of multiple choice test items and answer keys for the forestry component. Criteria for selecting items from the item bank for testing purposes were recommended. (Two tables display summary statistics and complete item analyses for each question in the item bank. Appendixes, amounting to approximately two-thirds of the report, contain the list of competencies, test items, and answer keys.) (YLB)

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COMPETENCY TEST ITEMS FOR APPLIED PRINCIPLES OF AGRIBUSINESS AND NATURAL RESOURCES OCCUPATIONS

FORESTRY COMPONENT

A Report of Research

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Introduction

The Vocational Education Act of 1963 and the Vocational Education Amendments of 1968 provided the foundation upon which the scope of traditional vocational education programs have been broadened and new programs have been initiated. As a result, vocational agriculture/agribusiness has been characterized by accelerated growth, expanded program offerings, and increased emphasis. For example, in 1967-68, Florida had 229 vocational agriculture/agribusiness departments and employed 284 teachers. According to Kirkland (1979), by the 1978-79 school year the number of departments had increased 62 percent (373 departments) and the number of teachers employed had increased by 103 percent (576 teachers). In the 1982-83 school year, there were 409 departments employing 573 vocational agriculture teachers (Department of Agricultural and Extension Education, University of Florida, 1982).

During this same period of time, there has been an increased emphasis regarding the need to develop and improve approaches for evaluating educational programs. Currently, a great deal of attention is being given to the concept of accountability in education. Effective educational evaluation is vital for improving education programs since it provides the basis upon which to determine the merits of existing programs, the need for new programs, and revision of existing programs.

In this atmosphere of accountability, legislators, educators, and the general public are asking if expenditures for vocational education are producing desired results and funding agencies are asking for evaluative information upon which to base policy decisions. Moreover, a review of the Vocational Educational Amendment of 1976 (American Vocational Journal, 1976) makes it clear that the writers of that

legislation expect evaluations of vocational education programs to yield data and information useful in formulating on-going and future policy and program decisions. However, from a review of a report to the Governor of Florida, it is obvious that sufficient data regarding the effectiveness of vocational education is not available, thus lending further support for the need to investigate this area (Governor's Commission on Secondary Schools, 1983).

In addition, competency-based education is a development receiving considerable attention in the literature and from professional educators. Florida is currently involved in a major effort to implement competency-based vocational education (Harrington, Johnson, Fagan, Freedman, and Reichman, 1976; Fagan and Huckaby, 1982). Using this instructional model, the curriculum is built around objectives that industry recognizes as necessary for employment. In addition, this model places major emphasis on evaluation of educational programs in terms of pre-specified outcomes, requiring that program outcomes be specified in terms of the behaviors, competencies, and performance capabilities expected of students completing instructional programs. Consequently, one measure of program effectiveness is the extent to which students completing or leaving an instructional program possess or fail to possess the behaviors and competencies specified in the instructional objectives. In instructional systems of this nature, test information is not only used to evaluate program effectiveness, but can also be used to evaluate the student's mastery of instructional objectives as an aid to placing students in appropriate employment or in additional instructional situations (Glasser and Nitko, 1971). Instruments or tests designed especially for this purpose are known as criterion-referenced tests (Hambleton and Novick, 1972).

Criterion-referenced tests are defined as tests made up of items keyed to a set of specific behavioral objectives (Ivens, 1970). Others have defined a criterion-referenced test as one that is deliberately constructed so as to yield measurements that are directly interpretable in terms of specified performance standards (Glasser and Nitko, 1971).

Criterion-referenced instruments have not been developed so that program effectiveness and student achievement can be assessed in most areas of agribusiness and natural resources. This activity was designed to develop criterion-referenced tests for the forestry component of Applied Principles of Agribusiness and Natural Resources Occupations.

Applied Principles of Agribusiness and Natural Resources Occupations (3720) is primarily designed to be taught at the tenth grade level and students who enroll should have completed Fundamentals of Agribusiness and Natural Resources Occupations (3710) in the ninth grade. Applied Principles consists of three components with each component designed to utilize one-third of the school year (60 days). All students complete the common core component consisting of competencies common to all agricultural/agribusiness occupations. The common core competencies are divided into three instructional areas: agricultural business management; agricultural mechanics; and leadership and citizenship development. Instructors then select two specialized components to complete the Applied Principles course from the following taxonomies: agricultural mechanics; agricultural production; agricultural products; agricultural resources; agricultural supplies and services; forestry; and ornamental horticulture. Each of these components are taught for one-third of the school year (60 days) and these two

components should be selected so as to provide the basic competencies for specialized programs offered at the eleventh and twelfth grade. More detailed descriptive information and specific planning data are available in the publication A Suggested Curriculum Guide for Applied Principles of Agribusiness and Natural Resources Occupations (Panhandle Area Educational Cooperative and Florida Department of Education, 1980).

Purpose

The central purpose of this study was to develop and field test written criterion-referenced tests for the forestry component of Applied Principles of Agribusiness and Natural Resources Occupations. In order to achieve this purpose, the following objectives were developed as guidelines for conducting the research:

1. Develop and compile a list of competencies for the forestry component of Applied Principles of Agribusiness and Natural Resources Occupations.

2. Develop a criterion referenced test for the forestry component of Applied Principles of Agribusiness and Natural Resources Occupations.

3. Field test the instrument in order to determine instrument validity and reliability, and to determine item difficulty, item discrimination, and point biserial correlation for each test item.

Procedure

Objective 1

Based upon the objectives identified in the Applied Principles of Agricultural Occupations Curriculum Guide (Curriculum Materials Center, 1978), a list of competencies was generated and compiled. This list was reviewed and modified by a group of teachers, Florida Department of Education regional consultants for agribusiness, and University of Florida faculty members at a Curriculum Development Workshop held in August, 1980 (Panhandle Area Educational Cooperative and Florida Department of Education, 1980). The competency statements reported in this document have undergone minor refinements in wording since their original publication in 1980. These competencies represent the performance standards relating to Applied Principles that students should master prior to entering specialized programs of agribusiness and natural resources education.

Objective 2

Using the competency statements derived in Objective 1, test items were developed for each competency statement. A consultant staff of teachers, regional consultants, and University faculty members was asked to review and revise the items developed. The consultant staff was specifically asked to accomplish the following tasks:

1. To review and revise individual test items.

2. To make certain that the items were technically accurate.

3. To verify that the item did assess the competency it was purported to address.

As a result of this activity, minor changes were made in the test.

Objective 3

The instrument was field tested by administering it to groups of students who had completed Applied Principles of Agribusiness and Natural Resources Ocupations. The data from the field tests were analyzed for item difficulty, item discrimination, and point biserial correlation. A Kuder-Richardson 20 Correlation was calculated as the measure for test reliability.

Results

The major results of this project were: a list of specific competencies for the forestry component of Applied Principles of Agribusiness and Natural Resources Occupations (see Appendix A) and an item bank of multiple choice test items and an answer key for the forestry component (see Appendix B).

Summary statistics relative to the ornamental horticulture component of Applied Principles are presented in Table 1. The estimate of reliability of the test by the Kuder-Richardson 20 correlation coefficient was .88.

TABLE 1
Summary Statistical Data Relative to the Forestry Component of Applied Principles of Agribusiness and Natural Resources Occupations

Instructional Area	Factor	Statistic
Forestry		
	Number of Students Taking Test	41.00
	Total Number of Items on Exam	79.00
	Highest Possible Score	79.00
	High Score	50.00
	Low Score	12.00
	Mean Score	34.39
	Median Score	34.00
	Mode Score	48.00
	Standard Deviation	10.65
	Standard Error of Measurement	3.64
	Kuder-Richardson 20 Correlation	0.88

A complete item analysis for each question in the item bank relative to forestry is displayed in Table 2. It may be observed that three statistics are presented: item difficulty; item discrimination; and item point biserial coefficient. Item difficulty (index of difficulty) is defined as the proportion of students who correctly answer an item. The average difficulty of a test is the average of the individual item difficulties. For maximum discrimination among students, an average difficulty of .60 is ideal.

Item discrimination (index of discrimination) is a numerical indicator of how the poorer students answered the item as compared to how the better students answered the item. The scores are divided into three groups with the top 27 percent of the scores in the upper group and the bottom 27 percent in the lower group. The number of correct responses for an item by the lower group is subtrated from the number of correct responses for the item in the upper group. The difference in the number correct is divided by the number of students in either group. The process is repeated for each item.

The point-biserial correlation coefficient is computed for the relationship between a variable for which there are only two categories of scores and a variable for which the scores exist on a continuous distribution. Thus, it is a correlation coefficient indicating the relative degree of relationship between how a student responds to an item and the student's total score on the test.

TABLE 2

Item Analysis of the Item Bank of Questions for the Forestry Component of Applied Principles of Agribusiness and Natural Resources Education

Item Bank Number	Item Difficulty	Item Discrimination	Item Point Biserial Correlation
1	0.78	0.45	0.46
2	0.44	0.82	0.66
3	0.29	0.36	0.36
4	0.44	0.55	0.46
5	0.85	0.27	0.38
6	0.44	0.27	0.16
7	0.71	0.55	0.40
8	0.56	0.82	0.68
9	0.76	0.55	0.50
10	0.57	0.32	0.42
11	0.59	0.45	0.42
12	0.29	0.73	0.65
13	0.44	0.64	0.46
14	0.56	0.36	0.35
15	0.05	0.00	-0.02
16	0.41	0.91	0.73
17	0.44	0.82	0.72
18	0.12	-0.27	-0.31
19	0.24	0.00	-0.03
20	0.00	0.00	0.00
21	0.46	0.44	0.36
22	0.71	0.55	0.57
23	0.80	0.64	0.58
24	0.85	0.36	0.41
25	0.56	0.64	0.49
26	0.32	0.82	0.65
27	0.29	-0.09	-0.07
28	0.37	-0.36	-0.18
29	0.71	0.64	0.46
30	0.68	0.82	0.67

Table 2 (Continued)

Item Bank Number	Item Difficulty	Item Discrimination	Item Point Biserial Correlation
31	0.51	0.91	0.74
32	0.17	-0.27	-0.31
33	0.63	0.73	0.53
34	0.54	0.82	0.58
35	0.02	0.00	-0.09
36	0.85	0.18	0.15
37	0.39	0.82	0.60
38	0.63	0.18	0.23
39	0.63	0.64	0.54
40	0.56	0.73	0.52
41	0.39	0.36	0.28
42	0.93	0.18	0.34
43	0.71	0.64	0.50
44	0.76	0.45	0.49
45	0.63	0.55	0.43
46	0.07	-0.18	-0.18
47	0.83	0.45	0.39
48	0.85	0.36	0.53
49	0.22	-0.36	-0.29
50	0.63	0.64	0.56
51	0.56	0.44	0.19
52	0.34	1.00	0.81
53	0.56	0.82	0.55
54	0.63	0.64	0.54
55	0.05	-0.09	-0.14
56	0.39	0.18	0.10
57	0.10	-0.09	-0.05
58	0.41	0.45	0.41
59	0.54	0.73	0.46
60	0.39	0.36	0.26
61	0.56	0.18	0.18
62	0.24	-0.09	-0.12
63	0.24	0.27	0.29
64	0.29	0.00	0.06
65	0.22	0.55	0.53

Table 2 (Continued)

Item Bank Number	Item Difficulty	Item Discrimination	Item Point Biserial Correlation
66	0.29	-0.09	-0.07
67	0.56	0.64	0.53
68	0.66	0.64	0.52
69	0.15	-0.18	-0.15
70	0.59	0.73	0.49
71	0.46	0.82	0.64
72	0.20	-0.09	-0.10
73	0.15	-0.09	-0.10
74	0.17	-0.09	-0.06
75	0.27	0.09	0.12
76	0.20	-0.36	-0.50
77	0.20	-0.27	-0.41
78	0.15	0.00	0.02
79	0.68	0.36	0.35

It is recommended that the following criteria be used for selecting items from the item banks for testing purposes:

1. Select items that pertain to the instructional objectives which specify the outcomes sought in the instructional program.

2. Select items that have a positive item discrimination index and a positive point biserial correlation coefficient.

3. Select items that were answered correctly by a substantial percentage of the students as indicated by the item difficulty score.

4. Select items that have high point biserial correlation coefficients thus indicating a relatively high relationship between how a student responds to the item and the student's total score on the test.

Recommendations

Based upon the results obtained from this activity, the following recommendations were made:

1. The student assessment test can be used by teachers who are interested in determining how well their students are achieving the competencies that are prescribed for the Applied Principles curriculum. These data should provide a reliable method of determining which instructional areas need further development or improvement.

2. It is recommended that the criteria, specified in the results section of this document, be used to select items for testing purposes.

3. Research be initiated to assess program effectiveness and student achievement in Applied Principles using a sample of the programs in Florida.

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APPENDIX A

Competencies for the Forestry Component of
Applied Principles of Agribusiness and
Natural Resources Occupations

Competencies for the Forestry Component
of Applied Principles of Agribusiness
and Natural Resources Occupations

1. The student will list 8 benefits of forest resources to man.
2. The student will list forest agencies, organizations, etc. (particularly local).
3. The student will list local occupational areas in forestry.
4. The student will list and be able to explain the "multiple use of forests."
5. The student will describe the different methods of planting seedlings and calculate cost and time it will take.
6. The student will determine the stocking rate and planting season of selected species of seedlings.
7. The student will : (a) determine and demonstrate the proper procedure to follow to obtain seedlings from state nurseries, and (b) determine and demonstrate the proper way to handle seedlings.
8. The student will determine and demonstrate selected safety practices to follow in timber management.
9. The student will list selected types of recreation in forestry.
10. The student will identify the role and habitat of selected wildlife in the forest.
11. The student will identify selected forest trees according to leaf, flower, fruit, twig, bark, taste, smell, etc.
12. The student will identify causes of fire according to statistics from forestry resources.
13. The student will list or identify the three classes of forest fires.
14. The student will develop fire prevention measures according to prescribed conditions.
15. The student will identify and be able to define selected terms such as head fire, etc.

16. The student will demonstrate the sharpening and care of selected hand tools, axes, rakes, etc.

17. The student will identify selected insects that do major damage to trees.

18. The student will identify selected diseases that do major damage to trees.

19. The student will: (a) find the township and range on a local map for selected areas on map, (b) use a compass and determine azimuth and bearings measurements or direction, (c) understand how to set up a transit compass and level 4 corners, (d) determine distance along selected property lines in chains and determine acres of land, (e) use a biltmore stick and determine board feet for sawtimber, and cubic feet for pulpwood, and (f) determine cords of wood from selected trees using biltmore stick and conversion charts.

20. The student will: (a) do general sharpening and repair of chain saw (trouble shooting), and (b) understand operating procedures and safety precautions to use while using a saw to fell or buck timber.

21. The student will demonstrate knowledge of first aid techniques that will apply to selected situations.

APPENDIX B

Item Bank of Multiple Choice Test Items
and Answer Key for the Forestry
Component of Principles of
Agribusiness and Natural
Resources Occupations

Item Bank of Test Items for the Forestry
Component of Applied Principles of
Agribusiness and Natural
Resources Occupations

Competency:

The student will list 8 benefits of forest resources to man.

1. Which of the following would be beneficial resources provided by a forest?

   a. Prevents soil erosion
   b. Prevents wind erosion
   c. Provides recreation
   d. All of the above

2. Which of the following is NOT a product from forest resources?

   a. Sports equipment
   b. Fuel
   c. Nylon
   d. All of the above are forest products

3. Which of the following is NOT a product from forest resources?

   a. Cellophane
   b. Acetate
   c. Plastics
   d. All of the above are forest products

Competency:

The student will list forest agencies, organizations, etc. (particularly local).

4. What is the Federal department that regulates America's agricultural industry, which includes all Federal, regional, state, and county divisions of forestry?

   a. U.S. Forest Service
   b. USDA
   c. American Forest Service
   d. American Forest Institute

5. Which of the following is the name of OUR state forestry agency?

   a. Florida Division of Forestry
   b. Florida's Forest Service
   c. Florida's Forestry Association
   d. Florida Forestry Commission

6. What is the function of Florida's state forestry agency?

   a. Sell hunting and fishing licenses to cover operating costs
   b. Buys and sells timber and operates state parks on a profit sharing basis
   c. To promote sound forest management and to provide fire protection to forest lands in Florida.
   d. All of the above

Competency:

The student will list local occupational areas in forestry.

7. Which of the following is an employment opportunity in the forest industry?

   a. Forester
   b. Consultant
   c. Wildlife Officer
   d. All of the above

8. Which of the following careers in forestry would require the LEAST amount of training following high school?

   a. Consultant
   b. Pilot
   c. Ranger
   d. Tower Person

Competency:

The student will list and be able to explain the "multiple use of forests."

9. What is the most important use of forest lands to private forest industries?

   a. Hunting
   b. Recreation
   c. Timber harvesting
   d. Livestock grazing

10. What is the most important use of forest lands to south Florida agriculturalists?

    a. Timber harvesting
    b. Livestock grazing
    c. Hunting
    d. All of the above

11. What is the most important use of state forests to our state forestry agency (state forester)?

    a. Livestock grazing
    b. Recreation
    c. Timber harvesting
    d. Multiple use

Competency:

The student will describe the different methods of planting seedlings and calculate cost and time it will take.

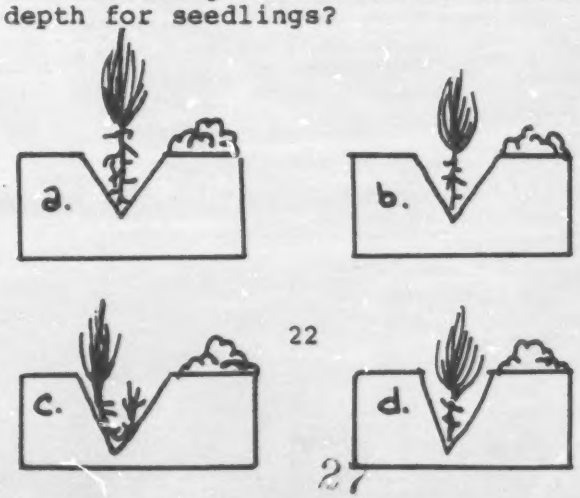
12. What is the name of the tool pictured?

    a. Planting bar (Dibble)
    b. Strade
    c. Hole digger
    d. Seedling planter (Stipple)

13. What is the name of the technique for holding trees at the planting site due to bad weather (refer to picture)?

    a. Trenching
    b. Sticking
    c. Heeling-in
    d. Strading

14. Which of the following illustrations demonstrates the correct planting depth for seedlings?



15. What material is used to coat seeds to aid their movement through seeding equipment?

    a. Dolomite
    b. Lime
    c. Clay
    d. Aluminum flakes

16. You are to plant 50 acres of slash pine at a recommended spacing (density) of 6 X 10. How many seedlings would you order to plant this acreage?

    * 43,560 square feet = 1 acre

    a. 3,000
    b. 6,000
    c. 30,000
    d. 36,300

Competency:

The student will determine the stocking rate and planting season of selected species of seedlings.

17. What is the season for broadcast planting of pine seeds in Florida?

    a. Winter
    b. Spring
    c. Summer
    d. Fall

Competency:

The student will: (a) determine and demonstrate the proper procedure to follow to obtain seedlings from state nurseries, and (b) determine and demonstrate the proper way to handle seedlings.

18. What is the deadline for ordering seedlings from Florida's state nurseries so that the state nursery will guarantee the delivery of your order?

    a. July 1st
    b. February 11th
    c. December 31st
    d. October 1st

19. What is the minimum order for a single species from Florida's state nurseries?

    a. 100
    b. 250
    c. 500
    d. 1,000

20. Where are seedlings from Florida's state nurseries delivered?

    a. County forestry offices and work centers
    b. Division of Forestry, District forestry offices and work centers
    c. County extension offices
    d. Any of the above, upon request

21. Where are applications made available to the public for seedlings from Florida's state nurseries?

    a. State forestry office
    b. County extension offices
    c. County forestry offices
    d. All of the above

22. Which of the following is very important concerning the proper methods of handling seedlings?

    a. Plant as soon as possible
    b. Prevent root exposure to air
    c. Bundles should not be opened until the temperature is above freezing
    d. All of the above

Competency:

The student will list selected types of recreation in forestry.

23. Which of the following is NOT considered to be a type of recreation in forestry?

    a. Fishing
    b. Sailing
    c. Hunting
    d. All of the above

24. Which of the following is a major type of recreation in forestry?

a. Hiking
b. Camping
c. Back packing
d. All of the above

Competency:

The student will identify the role and habitat of selected wildlife in the forest.

25. Which of the following Florida habitats now maintain the known population of Florida panthers?

a. Everglade National Park
b. Ocala National Forest
c. St. John's River Valley
d. None of the above

26. Which of the following wildlife species would you find in Florida's prairies?

a. Grey squirrel
b. Sandhill crane
c. Florida panther
d. Bobwhite quail

27. Which of the following is NOT an important benefit of hardwood hammocks as a Florida habitat for wildlife?

a. A variety of native grasses grown there
b. A variety of food supplies
c. Cover for protection
d. A variety of species live there

Competency:

The student will identify selected forest trees according to leaf, flower, fruit, twig, bark, taste, smell, etc.

28. Leaves are opposite and 3 to 5 lobed, tops are dark green, shiny and grayish below, yellow fall color. Seeds are winged (samara).

a. Florida Maple
b. Box Elder
c. Sycamore
d. Yellow Poplar

29. Bark is light gray, leaves are alternate, thick, and leathery with spiny teeth. Fruit is a dull red or yellow berry.

a. Round Holly
b. American Holly
c. Chinese Holly
d. Yaupon Holly

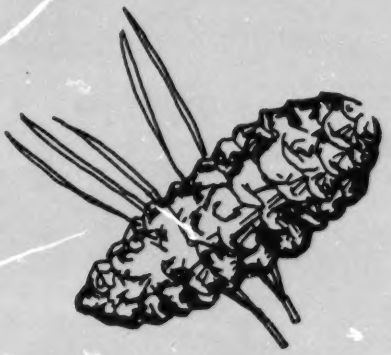
30. Leaves are simple, opposite, deciduous and 3 to 7 inches long. Small yellow flowers in the center of 4 large bracts which look like petals. Fruit are red drupes in fall.

a. Southern Magnolia
b. Flowering Dogwood
c. Round Holly
d. River Birch

31. Leaves are deeply lobed with 3 or 5, but rarely 7 lobes. Acorn is short stalked, oval in shape, full and rounded at both ends, and about 1/3 is covered by the cup.

a. Turkey oak
b. Live Oak
c. Water Oak
d. Shumard Oak

32. Needles are borne in clusters (fasicals) of 2 or 3 and about 8 inches long. Cones are 3 to 6 inches long, brown and glossy, armed with fine prickles, and are not persistent on the tree.



a. Loblolly Pine
b. Slash Pine
c. Longleaf Pine
d. Sand Pine

33. Leaves are simple, alternate, 5 ot 7 lobes, and have a distinctive odor. Margins of leaves are serrated. Brilliant fall color; yellow, orange, red and deep bronze. Fruit is about an inch in diameter and made up of many capsules with projecting spines.

a. Sycamore
b. Sweetgum
c. Florida Maple
d. Box Elder

34. Leaves are entire, single, and double lobed (three types). Flowers are greenish yellow and clustered. Bark is thick, deeply furrowed, reddish-brown, and twigs are bright green.

a. Sassafras
b. Yellow Poplar
c. Sycamore
d. Sweet Gum

Competency:

The student will identify causes of fire according to statistics from forestry resources.

35. What percentage of Florida's forest lands are burned each year?

a. 1%
b. 3%
c. 5%
d. 7%

36. What is the cause of 91% of Florida's forest fires?

a. Lightning
b. Natural drought conditions
c. Man
d. Power lines

37. What is the cause of 1/3 of the forest fires that are started by man?

a. Campfires
b. Smokers
c. Arson
d. Debris burning

Competency:

The student will list or identify the 3 classes of forest fires.

38. What class (type) of forest fire burns from top to top of trees or shrubs?

    a. Crown
    b. Ground
    c. Surface
    d. Flash

39. What class (type) of forest fire burns leaf litter of loose debris on the forest floor and small vegetation, and may burn into the upper portion of trees?

    a. Crown
    b. Ground
    c. Surface
    d. Flash

40. What class (type) of forest fire burns the organic materials beneath the leaf litter on the forest floor?

    a. Crown
    b. Ground
    c. Surface
    d. Flash

Competency:

The student will develop fire prevention measures according to prescribed conditions.

41. You are managing a 12 year stand of slash pine, which of the following fire prevention measures would reduce the damage by fire while increasing feed for wildlife?

    a. Proper control burning
    b. Dividing the tract into many small plots with firebreaks
    c. The seeding of clouds, to make it rain
    d. Maintain a team of fire fighters to fight fires by direct methods

Competency:

The student will identify and be able to define selected terms such as head fire, etc.

42. What is an uncontrolled fire in the forest called?

a. Backfire
b. Wildfire
c. Head fire
d. Ground fire

43. Which of the following is one of the three methods of fighting fire?

a. Rob the fire of material to burn
b. Reduce the fire's temperature
c. Cut off the oxygen
d. All of the above

44. What is the name of a fire set to burn against the wind in the direction of an oncoming fire?

a. Ground fire
b. Surface fire
c. Backfire
d. Flash fire

45. In terms of fires, what are needles, leaves, twigs, and other debris?

a. Leaf litter
b. Surface litter
c. Fuel
d. Topography

Competency:

The student will demonstrate the sharpening and care of selected hand tools, axes, rakes, etc.

46. What is the correct procedure for sharpening an axe on a grinder?

a. Grind on both sides
b. Grind on one side only
c. Always travel in the direction the handle is pointing
d. Both A & C

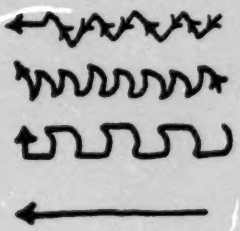
47. Which of the following diagrams is the correct motion to use while sharpening an axe on a grinder?

a.

b.

c.

d.



48. Which of the following is used when replacing a handle in an axe or hammer?

a. Wood wedge
b. Light oil
c. Metal Wedges
d. Both A & C

49. Most types of replacement handles are secured by the same method, which of the following is the exception?

a. Shovel
b. Scoop
c. Grubbing hoe
d. Rake

Competency:

The student will identify selected insects that do major damage to trees.

For Questions 50 through 60, identify the forest insect pests from the list beside it.

50. a. Test Caterpillar Adult
b. Leaf Miner
c. Hornet
d. None of the above

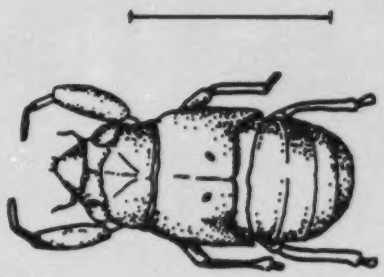
51. a. Tent Caterpillar Adult
    b. Leaf Hopper
    c. Sawfly
    d. Cicada

52. a. Sycamore Lace Bug
    b. Bark Beetle
    c. Sawfly Nymph
    d. Aphid

53. a. Leaf Miner Adult
    b. Tent Caterpillar Adult
    c. Sycamore Lace Bug
    d. Aphid
    e. None of the above

54. a. Sawfly Larva
    b. Saddleback Caterpillar
    c. Tent Caterpillar
    d. Metallic Wood Borer - Larva

55. a. Bark Beetle Nymph
b. Aphid
c. Cicada Nymph
d. Acorn Weevil



56. a. Acorn Weevil
b. Pitch-Eating Weevil
c. Sycamore Lace Bug
d. Leaf Miner

57. a. Tent Caterpillar
b. Sawfly Larva
c. Leaf Miner Larva
d. Saddleback Caterpillar

58. a. Bark Beetle
b. Pitch-Eating Weevil
c. Aphid
d. Acorn Weevil

59. a. Bark Beetle
b. Sycamore Lace Bug
c. Pitch-Eating Weevil
d. Leaf Miner

60. a. Saddleback Caterpillar
b. Tent Caterpillar
c. Sawfly Larva
d. Leaf Miner Larva

61. Looking closely at the leaves in the picture below, it shows that the light areas are where tissue has been eaten from between the top and bottom sides of the leaves. Which of the following insects caused this damage?

a. Ambrosia Beetle Larva
b. Leaf Miner
c. Tent Caterpillar
d. Aphid

Competency:

The student will identify selected diseases that do major damage to trees.

62. The picture below is an oak struck by lightning. A fowl smelling fluid flows from the old wound and is building up on the trunk. Which disease has infected this oak?

a. Slime flux or wetwood
b. Butt rot
c. Oak canker
d. No disease, fluid caused by lightning

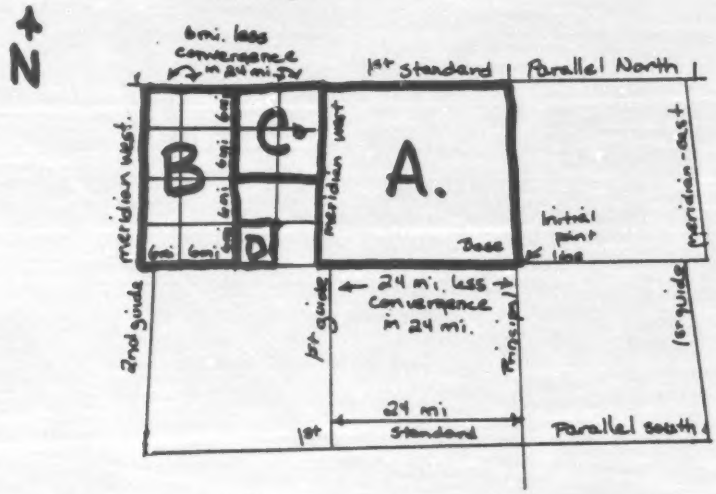
63. Which of the following diseases is the most serious disease of red cedar, causing severe foliage loss and death of trees?

a. Cedar Apple Rust
b. Anthracnose
c. Fall Root Rot
d. Juniper Blight

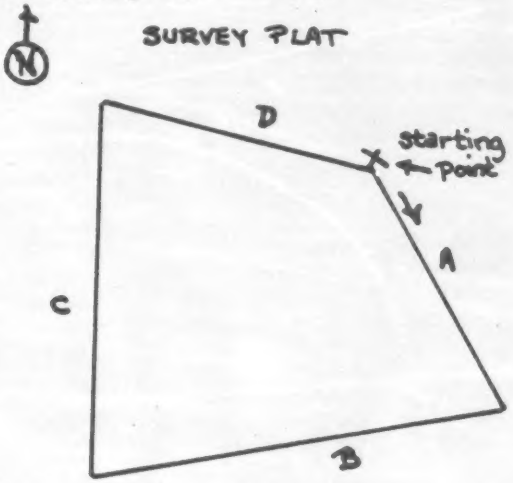
Competency:

The student will: (a) find the township and range on a local map for selected areas on map, (b) use a compass and determine azimuth and bearings measurements or direction, (c) understand how to set up a transit compass and level 4 corners, (d) determine distance along selected property lines in chains and determine acres of land, (3) use a biltmore stick and determine board feet for sawtimber, and cubic feet for pulpwood, and (f) determine cords of wood from selected trees using biltmore stick and conversion charts.

64. Refer to the map grid below. Which of the following (A, B, C, or D) is called a township?



65. The plat below was surveyed in A, B, C, D order starting at X. Which line would have a reading of S 75° E?



66. You are leveling a transit with the thumb screws. What is the procedure for leveling the transit?

a. Turn both screws clockwise at the same time
b. Turn both screws counter clockwise alternately
c. Turn both screws counter clockwise at the same time
d. Turn both screws opposite of each other at the same time

The following conversions may be used in answering Questions 67 through 74.

1 mile = 80 chains
1 chain = 66 feet
43,560 sq. feet = 1 acre
5,280 feet = 1 mile

1 acre = 10 sq. chains
1 cord = 4' X 4' X 8'
1 cord = 128 cubic ft.
Total cu. ft.- 90 = cords

67. You are going to plant 622 trees per acre on a rectangular tract of land that has been measured to be 20 by 50 chains. How many acres are in this tract?

a. 100 acres
b. 50 acres
c. 10 acres
d. 1 acre

68. You have measured a tract of land to be 99 by 264 feet. What are the dimensions of this tract in chains?

a. 2 by 3 chains
b. 1 1/2 by 4 chains
c. 3 by 6 chains
d. 2 1/2 by 3 1/2 chains

69. What is the length of pulpwood bolts specified by pulp mills?

a. 4 feet
b. 5 feet
c. 5 feet 3 inches
d. All of the above

Pulpwood Volume Table

Cubic Foot Volume Table - Second Growth Southern Pine

	Number of 51/4 - Foot Cuts										
DBH	2	3	4	5	6	7	8	9	10	11	12
6	1.4	2.2	2.8	3.6	4.2	4.9					
8		3.5	4.8	6.0	7.2	8.5	9.5	10.8			
10			7.1	8.9	10.6	12.5	14.3	16.1	17.9	19.6	
12				12.2	14.7	17.0	19.9	22.0	24.4	26.8	29.3
14				15.8	19.0	22.1	25.2	28.5	31.6	34.7	37.9
16					23.4	27.4	31.3	35.3	39.2	43.9	47.0

70. Using the pulpwood table above, what is the total cubic feet of these 5 trees measured with a biltmore stick?

DBH	5 1/4 Bolts
1. 6	6
2. 10	5
3. 14	9
4. 16	10
5. 12	8

a. 20.06 cubic feet
b. 93.9 cubic feet
c. 100.3 cubic feet
d. 104.5 cubic feet

Volume (Board Feet) by Number of
Usable 16 - Foot Logs

DBH											
	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6
21.	176	240	304	358	411	450	490	523	556		
22.	194	266	338	398	458	504	549	588	626		
23.	214	294	374	441	508	558	607	652	698		
24.	234	322	409	484	558	611	665	718	770		
25.	258	355	452	534	617	678	740	799	858		
26.	281	388	494	585	676	745	814	880	945		
27.	304	420	536	636	737	811	886	959	1032		
28.	327	452	578	686	795	877	959	1040	1120	1190	1261
29.	354	491	628	746	864	953	1042	1132	1222	1306	1389
30.	382	530	678	806	933	1028	1124	1224	1325	1421	1517

71. Using the sawtimber volume table above, what is the total board feet of these 5 trees measured with a biltmore stick?

DBH	16 Foot Logs
1. 25	4
2. 29	4 1/2
3. 28	5 1/2
4. 22	3
5. 24	3 1/2

a. 128 Board Feet
b. 826 Board Feet
c. 4,250 Board Feet
d. 4,131 Board Feet

72. You have measured 20 trees with a biltmore stick totaling 720 cubic feet. How many cords of wood are in 720 cubic feet?

a. 5 1/2 cords
b. 72 cords
c. 36 cords
d. 8 cords

73. You have measured 40 trees with a biltmore stick totaling 1,440 cubic feet. How many cords of wood are in 1,440 cubic feet?

a. 11 1/4 cords
b. 16 cords
c. 36 cords
d. 144 cords

74. You have measured 30 trees with a biltmore stick totaling 1,080 cubic feet. How many cords of wood are in 1,080 cubic feet?

a. 8 1/2 cords
b. 108 cords
c. 36 cords
d. 12 cords

Competency:

The student will: (a) do general sharpening and repair of chain saw (trouble shooting), and (b) understand operating procedures and safety precautions to use while using saw to fell or buck timber.

75. Which of the following is a type of teeth found on chain saws?

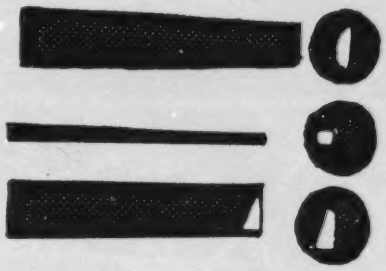
a. Square-hooded
b. Cutter-raker
c. Round-hooded
d. All of the above

76. Which of the following files could be used for sharpening chain saws?

a. Half round file

b. Square file

c. Crosscut file



d. All of the above

77. Which of the following is the proper operating procedure for bucking timber with a chain saw?

a. Start removing limbs at the top of the felled tree
b. Remove limbs after sawing trunk into bolts
c. Saw limbs on opposite side of the trunk of the felled tree
d. Saw limbs on opposite and your side of trunk

Competency:

The student will demonstrate knowledge of first aid techniques that will apply to selected situations.

78. A forest worker has a deep cut on the lower leg and the bleeding is severe. The first 2 techniques for stopping severe bleeding have not stopped the bleeding. Which of the following is the third step to take?

a. Apply pressure to pressure point on the brachial artery
b. Elevate the leg above the heart
c. Apply direct pressure over the wound
d. Apply pressure to pressure point on the femural artery

79. You just found a forest worker who faints when he tries to stand, is very weak, sweating heavy, has pale clammy skin, and has about normal body temperature. The forest worker has the symptoms of which of the following illnesses?

a. Heart stroke
b. Major stroke (apoplexy)
c. Heat exhaustion
d. Epilepsy

ANSWER KEY
FORESTRY

1.	D
2.	C
3.	D
4.	B
5.	A
6.	C
7.	D
8.	D
9.	C
10.	D
11.	D
12.	A
13.	C
14.	B
15.	D
16.	D
17.	D
18.	D
19.	C
20.	B
21.	D
22.	D
23.	B
24.	D
25.	A
26.	B
27.	A
28.	A
29.	B
30.	B
31.	A
32.	B
33.	B
34.	A
35.	A
36.	C
37.	C
38.	A
39.	C
40.	B
41.	A
42.	B
43.	D
44.	C
45.	C
46.	A
47.	D
48.	D
49.	C
50.	D
51.	D
52.	D
53.	A
54.	C
55.	C
56.	C
57.	B
58.	D
59.	A
60.	A
61.	B
62.	A
63.	D
64.	D
65.	D
66.	D
67.	C
68.	B
69.	D
70.	C
71.	D
72.	D
73.	B
74.	D
75.	D
76.	B
77.	C
78.	D
79.	C